

TENNESSEE PRESCRIBED BURNING PROCEDURES

by

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The Natural Resources Conservation Service (NRCS) of Tennessee supports and encourages the use of Prescribed Burning (Code 338), Section IV of the Field Office Technical Guide, on private, Conservation Reserve Program (CRP), and Wildlife Habitat Incentives Program (WHIP) land contracts. However, until NRCS personnel have completed Prescribed Burning Certification training, prescribed burns will only be conducted by qualified individuals from the Tennessee Division of Forestry (TDF), Tennessee Wildlife Resources Agency (TWRA), and U.S. Forest Service (USFS). NRCS **will not** conduct burns, but assist in the formation of a burn plan with a landowner. Burns planned with NRCS assistance must adhere to all federal, state, and local laws regarding outdoor burning, fire control, smoke management, and air quality. The following statements should be considered before conducting a prescribed burn.

- A written burn plan by qualified personnel must be **completed** prior to the burn date and **present** on burn day.
- The crew should have suppression tools in the event of a spot fire or if the fire escapes.

Natural Resources Conservation Service (NRCS) Liability

Tennessee NRCS employees **cannot** participate in the following activities:

- Serve as fire boss.
- Assist with the ignition of fire, use suppression equipment, or aid in post-burn mop-up activities.

NRCS field office personnel **can** participate in the development of a burn plan with a landowner and the Tennessee Division of Forestry and in the determination of weather conditions on burn day. NRCS's main responsibility in helping landowners develop burn plans is to encourage safety. It is imperative the landowner is notified **in writing by signing the burn plan** that he/she may be liable for damages if the fire escapes or smoke creates hazardous conditions.

Landowner Liability

Landowners are responsible for adhering to the Clean Air Act (42 U.S. C. 7401-7671q). The landowner must obtain a burn permit from the Tennessee Division of Forestry before the burn date at **1-800-337-3157**. In addition, the landowner must notify in writing neighboring residences, businesses, and schools of intent to burn two days prior to burn day. In addition, the landowner is to inform neighbors of possible smoke, air quality, and visibility hazards. The landowner is required to light the first match and assumes full liability (**TN Code Annotated 68-17-146**). Prior to burn date, the landowner should make a list of city and county emergency numbers, such as the Volunteer Fire Department and Sheriff's office and have that list present on the burn day.

If NRCS field office personnel write a burn plan, and the weather is not conducive to a safe burn on the burn day **and the landowner** continues to ignite, the **landowner accepts full liability** for any damages that may occur. In addition, the documentation of conditions that led to the termination of NRCS technical assistance will be communicated to the landowner and in writing.

Rx BURN FACT SHEET

Elements of a Safe Prescribed Burn

1. **Site Description:** Gives geographical location of burn unit, client name, soil type, fuel type at burn unit, the number of acres to be burned, a list of grass or vegetation present on site, and topography.
2. **Management Objectives:** In order to conduct a safe burn, the objectives of the burn must be known. Objectives should include the reason for the burn (i.e., fuel reduction, native warm season grass management, wildlife habitat improvement, etc.).
3. **Fuel Types:** The fuel types most important to Tennessee are grasses. Most of the native warm season grasses and forage species are in this category. The second fuel type is shrubs such as lespedeza shrubs which are highly flammable. The third fuel type is logging slash, the leftovers after timber cutting or thinning. Grass and shrubs are considered fine, light fuels because they ignite and burn quickly due to small size and ease of ignition. Heavy fuels such as limbs and tree trunks burn significantly slower than light fuels.
4. **Communication:** Always inform the local fire departments, sheriff's office, and adjacent landowners of the intent to burn prior to burn day. Have a list of emergency numbers present on burn day. Also obtain a fire weather report from <http://www.srh.noaa.gov/BNA> before ignition.
5. **Liability Statement and Signature Approval Sheet:** Lists the names and signatures of the person who wrote the plan and the reviewing agent. NRCS personnel will not ignite the fire and are not responsible in the event of an escape.
6. **Fire Prescription:** Describes an acceptable range of fire weather, moisture, fuel, and ignition techniques to meet the objectives of the burn.
7. **Weather Information:** Immediately before ignition, a crewmember should use a fire weather kit to determine wind speed, direction, relative humidity, temperature, etc.
8. **Types of Fire and Ignition Patterns:**
 - **Control Lines** - A combination of natural fire barriers and dozer lines plowed down to mineral soil used to control a fire.
 - **Black Lines** - Preburning of fuels adjacent to a control line before ignition of the main headfire. Within the black line areas, there is no unburned fuel.
 - **Headfires** - A fire set to go with the direction of the wind (head firing).
 - **Backfires** - A fire that burns against the wind and usually slower and set inside the control lines to slow or contain a rapidly spreading fire (backfiring). This is the preferred fire for prescribed burns.

- **Strip Firing** - Setting fire to more than one strip of fuel simultaneously and allowing strips to burn together.
 - **Edge Firing** - A technique in which fires are set along the edges of an area and allowed to spread to the center of the burn unit.
 - **Flank Firing** – A flank fire is set directly into the wind and parallel to the fire lines. It is used for blacklining and setting the main fire when extra control of the fire behavior is needed.
9. **Suppression:** A burn plan must state the routes and actions taken in the event of spot fires or changes in wind direction. Designate personnel and equipment available for suppression. Under no circumstances will a crewmember attack a head fire or get in front of a fire.
10. **Smoke Management:** Lists smoke management techniques of emission reduction and smoke avoidance. Adhere to the following guidelines:
- **Comply with air pollution regulations, burn only when atmosphere is suitable for rapid dispersion, and burn only when the wind can transport smoke away from roadways, busy intersections, and schools. Note locations of schools, major roads, and businesses on the sketch of burn unit. Also include the direction of smoke dispersal.**
11. **Mop-up Procedures:** Mop-up is the responsibility of the landowner, including walking the entire burn unit and extinguishing any smoldering areas (i.e., hollow trees, brush, log piles) with water, swatters, and other suppression equipment.
12. **Equipment:** The following list consists of recommended tools for prescribed burning:
- **{Pumper (100- 200 gallon capacity), belt weather kit, gasoline/diesel fuel, drinking water, drip torches, hand tools (rakes, swatters, backpack pumps), dozer, and two-way radio communication instruments}**

RED FLAG CONDITIONS THAT INHIBIT A SAFE BURN

1. **WIND GUSTS GREATER THAN 20MPH.**
2. **RELATIVE HUMIDITY BELOW 20 PERCENT.**
3. **AIR TEMPERATURE ABOVE 80 DEGREES.**
4. **COLD FRONT TO PASS WITHIN 12 HOURS.**
5. **UNFAVORABLE FIRE WEATHER FORECAST.**
6. **"BAN ON OUTDOOR BURNING" DECLARED FROM TENNESSEE GOVERNOR.**

Table 1.
Required Environmental Conditions for Blacklines and Headfires

Parameter	Blacklines			Headfires	
	Desired	Acceptable		Desired	Acceptable
Temperature	40-60 degrees	35-65 degrees		70-80 degrees	60-85 degrees
Humidity	40-60 percent	30-65 percent		25-40 percent	20-45 percent
Wind Speed	0-8 mph	0-10 mph		8-15 mph	5-20 mph
Wind Direction	Any	Any		Southwest	From South to West
Width of Blacklines	100 feet – Non-volatile Fuel 500 feet - Volatile Fuel				
Time	Midmorning to Late Afternoon	Midmorning to Late Afternoon		Midday to Late Afternoon	Midday to Late Afternoon

Burning on Conservation Reserve Program (CRP) Sites (CP2, CP4(d), CP22, CP25)

For shrub and/or tree planting preparation, prescribed fire exposes mineral soil and controls unwanted vegetation until seedlings become established.

To stimulate seed production and encourage maximum yield and quality of a stand, the warm season grasses should be burned every two years during late winter to late spring.

For the management of trees and other vegetative components within riparian buffers and to control undesirable hardwoods, prescribed burning should be done every two-three years during the fall and spring.

Warm season grasses such as switchgrass have high fuel loads, therefore expect a hot fire.

Select weather conditions that are damp and cool to slow the fire.

- Relative humidity determines the heat intensity and length of the burn, thus, the higher the relative humidity, the cooler the fire. Avoid burning CRP sites at less than 20 percent relative humidity. The preferred humidity range is 40-60 percent.
- Higher temperatures cause fires to burn faster. Therefore, burn on days with low temperature and avoid days when temperature is over 70 degrees Fahrenheit. Temperatures within the 40-60 degree Fahrenheit range are ideal.
- Wind speeds of 3-12 mph are preferred due to the fact that wind direction must be constant throughout the burn. Do not burn on a day when a wind shift is expected, since wind shifts will turn easy-going backfires into headfire monsters. In Tennessee, most of the wind is from the south or southwest direction.

- Control lines for a CRP site of warm season grasses could be a ten-foot wide dozer plow line and 100 feet long.

Burning on Wildlife Habitat Incentives Program (WHIP) Sites (WHIP 3, 4, 5, 6, 11)

Prescribed burning should be done every two years during January-March to avoid killing new spring grass growth and interfering with nesting season. Generally, the best fire for burning on WHIP areas is a backfire with wind speed between 5-8 mph.

Prescribed burning is useful in WHIP 3 and 4 for seedbed preparation and elimination of undesirable grass species.

Since the entire WHIP program exists for the improvement of wildlife habitat, prescribed burns help understory species that need a more "open habitat", WHIP 5 and 6.

Fruit and seed production is stimulated while yield and quality increases in herbaceous vegetation and legumes. However, remember to honor the nesting seasons and do not burn during those times.

In WHIP 11, prescribed burning helps maintain wood and grass buffer areas.

Sample Prescribed Burn Plan

Client _____ Contract No. _____ Program _____

Address _____ County _____ City _____

Acres to be Burned _____ Projected Date of Burn _____

Previously Burned? _____

Check Management Objectives that will be Achieved by Burning this Site.

_____ Eliminate noxious weeds, undesirable plants, insects or pests.

_____ Control understory growth and eliminate unwanted woody vegetation.

_____ Prepare seedbeds for planting or seeding.

_____ Improve access to woods by opening forest canopy.

_____ Stimulate the seed production of grasses and legumes beneficial to wildlife.

_____ Increase the yield and quality of herbaceous plants and legumes.

_____ Facilitate an opening or corridor for wildlife within woodlands.

_____ Other _____

Site Description (Include fuel type [grass, logging slash, non-volatile, volatile], soil type, vegetation present, and topography):**Sketch of Burn Unit (Include legend with north arrows, show major roads and buildings):****Possible Barriers to Objectives (i.e., unsafe weather conditions, nesting seasons):**

Weather and Rainfall: Rain in Past 2 Years ____ Average ____ Moderate ____ Heavy

For the following questions, answer with a yes or no.

Rain in the past 24 hours? ____ **Cold front passing within 12 hours?** ____

Will smoke reduce visibility or endanger homes? ____

Prescription: Temperature ____ **Relative Humidity** ____
Wind Direction ____ **Wind Speed** ____

Mixing Height ____ **Starting Time** ____

**** Refer to Table 1 for an acceptable prescription range. If your prescription is not within the acceptable range, do not burn.**

Firing Method (Describe how the burn will be ignited and sketch a map, if needed):

Blacklines

Main Fire (Head Fire)

Suppression Plan (List equipment available to contain fire in the event of an escape and draw the techniques of fire suppression):

Smoke Considerations (Show wind direction needed for maximum smoke dispersion, show what wind direction is needed for a good burn, and write plans for smoke management):

Equipment (List number of crew members and tools available):

Communication (List the names and numbers of adjacent neighbors and the numbers for the local fire department, sheriff's office, and Tennessee Division of Forestry):

Name

Phone number

Mop-up Procedures (Describe measures that landowner will take to ensure all smoldering embers are extinguished before leaving burn unit):

Liability Statement:

By signing below I have agreed to the implementation of the burn plan as written by the NRCS Conservationist. I have read the Prescribed Burn Procedure, and I understand that NRCS is not liable for any damages that may occur in the event of fire suppression or escape. I accept full responsibility for any damages that could occur during the prescribed burn.

Landowner

Date**Plan Written By:**

Conservationist

Date**Plan Approved By:**

Tennessee Division of Forestry

Date

Total Cost Analysis for a Prescribed Burn

This is an estimate of the cost for burning a 40-acre site.

ITEM	UNIT	COST	DAYS USED PER YEAR	PRICE	TOTAL
Pumper Truck (Driven 20 Miles Roundtrip to Burn Unit)	1 ea.	.50 mi. x 20 mis. x 1 day	1	\$10.00	\$10.00
Drip Torches	2 ea.	\$20.00	1	\$10.00	\$20.00
Swatters	2 ea.	\$13.95	1	\$13.95	\$27.90
Shovels	2 ea.	\$13.75	1	\$13.75	\$27.50
Two-way Radios	4 ea.	\$18.06	1	\$18.06	\$72.24
Backpack Pump	1 ea.	\$33.87	1	\$33.87	\$33.87
Gloves	4 pairs	\$4.50	1	\$4.50	\$18.00
Belt Weather Kit	1 ea.	\$23.80	1	\$23.80	\$23.80
Tandem Disc Plow (10 feet wide)	1 day	\$6,500	1(6 hours)	\$5.20 per hour	\$31.20
Tractor (New)	1 day	\$55,000 (100 hp)	1 (6 hours)	\$13.50	\$81.00
Gasoline	4 gals.	\$1.20	1	\$4.80	\$4.80
Diesel	2 gals.	\$1.50	1	\$3.00	\$3.00
TOTAL COST OF BURN					\$353.31
TOTAL COST OF BURN PER ACRE (40 ACRES)					\$8.83 per ac.

References:

1. Nebfacts. Conducting a Prescribed Burn on Warm Season Grass CRP sites.
<http://www.ianr.unl.edu/pubs/range/nf268.htm>
2. Texas Tech University. Department of Range and Wildlife Management. 1986. Getting Started in Prescribed Burning. Management Note 9.
3. USDA, Forest Service. 1989. A Guide For Prescribed Fire in Southern Forests. Tech Publication R8-TP11.
4. USDA, Forest Service. 1986. Prescribed Fire Plan Guide.
5. USDA, Forest Service. 1994. Introduction to Wildland Fire Behavior.
6. USDA, Forest Service. 1988. Prescribed Fire Smoke Management Guide.
7. USDA, Natural Resources Conservation Service. 1997. NRCS Policy on Prescribed Burning on Grazing Land.